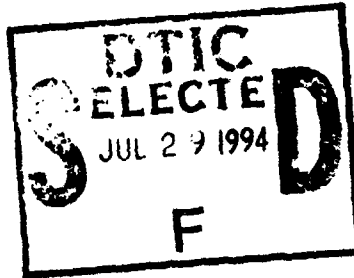


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18 July 1960

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ELEVENTH ALL-UNION CONFERENCE ON HIGH-MOLECULAR-WEIGHT COMPOUNDS

- USSR -

by N. F. Bakeyov

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JPRS: 3552

CSO: 3448-D

ELEVENTH ALL-UNION CONFERENCE ON HIGH-MOLECULAR-WEIGHT COMPOUNDS,

2-7 July 1959

[Following is a translation of an article by N. F. Bakeyev in Vysokomolekulyarnyye Soyedineniya (High-Molecular-Weight Compounds), Vol. I, No. 1, Moscow, December 1959, pages 1877-1891.]

The Eleventh Regular All-Union Conference on High-Molecular-Weight Compounds was devoted to basic problems of the processing and utilization of polymers.

The choice of a subject for this regular conference is linked with the pressing necessity for a broad discussion of the ways of putting the polymers in our country to use in a manner appropriate to the turbulent expansion which the polymer industry is undergoing at the present time. According to the decisions of the May 1958 Plenum of the Central Committee of the Communist Party of the Soviet Union, and the confirmation for 1959 of the Seven-Year Plan for the Development of the USSR National Economy, the domestic polymer industry is to be transformed into the largest chemical industry of the country; therefore a timely determination of the areas of utilization of polymers will be of help in making rational use of the output of the polymer industry.

The sessions of the All-Union Conference, convoked by the Chemical Sciences Division of the USSR Academy of Sciences, the State Committee on Chemistry of the USSR Council of Ministers, the All-Union Chemical Society imeni D. I. Mendeleev and the Moscow State University imeni M. V. Lomonosov, took place in Moscow from 2 to 7 July 1959. A special feature of the conference has been the fact that it attracted an extremely wide circle of participants. The approximately 2,000 scientists and engineers who took part in this conference represented 600 diverse organizations in the Soviet Union engaged in processing and utilizing polymers. Eight reports were delivered at the four plenary sessions of the conference, and at the meetings of its eight sections 203 reports were presented by a total of 420 authors.

In his opening speech, Academician N. N. Semenov stressed the actuality of the problems which constituted the subject to be discussed by the present conference. N. N. Semenov made note of the fact that, whereas in the field of polymer chemistry and physics we have to a certain extent already developed a tradition of periodically

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discussing pressing scientific problems, in the field of polymer processing and utilization such broad discussions have not taken place. The examination of such questions at the present conference is, without question, a great event in the life of our chemical community and will facilitate the widespread utilization of polymers in the most diverse ramifications of our country's national economy.

At the first plenary session a report was presented by Academician V. A. Kargin. His report dealt with the relationship of the structure of high molecular-weight compounds to their properties. Having noted the enormous practical value of polymers to the national economy of the land, V. A. Kargin paused to examine the requirements upon which the production of new polymers must be based, and the principles which make it possible for such requirements to be realized. One of the requirements is the necessity of producing polymers which are serviceable over a wide temperature range. One of the ways of expanding the temperature range of serviceability for plastics is the synthesis of polymers with regular chain structure, i.e., the derivation of crystallizing products. In such products the vitrification point is shifted to a higher temperature range; on the other hand, however, these materials are prone to brittleness at low temperatures. V. A. Kargin noted that it was technically possible to expand the temperature range of serviceability for crystalline plastics by means of their plastification, which leads to a reduction in the vitrification temperature of the product. The melting point is little changed in such a case, since plastification changes only the temperature of the solution of the crystalline substance in the plasticizer. For elastomers there arises the converse requirement of expanding the temperature range of the existence of a state of high elasticity of the substance. This requirement contradicts the problem of obtaining strictly regular chains in polymers, whereby crystallizing products are derived. In order to prevent the origination, undesirable in this case, of polymer crystals, two means may be employed: on the one hand, the production of graft copolymers and, on the other, employment of the active fillers obtained in the grafting of polymers to hard surfaces. Much attention was paid by the lecturer to the problem of employing polymers with rigid chains. The synthesis of such polymers is of great importance to the production of types of polymer glass possessing high stability over a wide temperature range. The same purposes are served by inorganic polymer materials, the synthesis of which, together with investigation of the properties thereof, constitutes a new trend in polymer chemistry.

In his report on new polymer materials in the areas of their application, corresponding member of the USSR Academy of Sciences V. V. Korshak dwelt on the discovery of new means in the field of polymer synthesis and, in particular, on the processes of stereospecific polymerization and polycondensation at the division boundary

of two phases formed by non-mixing liquids. The lecturer pointed out that, with the discovery of new means of synthesis which facilitate the introduction into the sphere of synthesis of a large number of new monomers, together with the concurrent employment of previously known methods, the number of new polymers produced each year has been considerably increased. However the rise in the number of new polymers has not led to a broad expansion of the range of materials directly suitable for practical application; this is due to the fact that the properties of a majority of the new products obtained are very close to the aggregate of properties of polymers already known. The lecturer also discussed the property characteristics and the fields of application of the principal types of new polymers.

The report by Professor G. P. Mikhaylov, under the joint authorship of B. I. Sazhin, dealt with the employment of polymers in engineering as electrical insulation materials. After discussing the principal rules governing the electrical properties of polymers, the lecturer devoted his principal attention to an examination, in polymers, of the phenomena of dielectric losses and polarization. These properties were examined in relation to the structure of the high-molecular-weight compounds, chemical composition, and the nature of the thermal motion of the macromolecules, since the electrical properties of polymers strongly depend upon the last-mentioned factor.

The report of Candidate of Technical Sciences B. A. Kiselev dealt with the wide range of polymer materials employed as structural plastics. The central point of the report was a discussion of the physical and mechanical characteristics, the technological properties, and the possible field of employment of glass plastics, which occupy a special position among the other structural materials on account of their high mechanical strength. With reference to problems concerning the production of fiberglass fillers and the synthesis of binders, B. A. Kiselev noted that the increasing use of glass plastics requires that special methods be developed for the fabrication of products from them. Such methods must permit the employment of these materials in other structures besides those of the three-layer type, the production techniques for the latter being complex and labor-consuming. In addition to the discussion of glass plastics, the outlook for the industrial application of asbestos plastics was examined. The high heat resistance of asbestos-fiber fillers is responsible for the increasing employment of such plastics in the construction of heavy machinery, railroad transport, in aircraft engineering and in rocketry. The lecturer also touched on the important question of the utilization of wood plastics, for which there exist practically limitless raw material resources and which have a broad future in the national economy of the Soviet Union; he also discussed the utilization of a number of other plastics based on organic fiber.

The state of our knowledge and the basic problems in the investigation of the mechanical problems of polymers was the subject of the report of Professor G. L. Slonimskiy. Speaking of the contemporary state of the question in the field of the fundamental mechanical properties of polymers, viz: elasticity, strength, viscosity, and surface properties, G. L. Slonimskiy noted that the science of mechanical properties is only in the initial stages of its development, with its basis in the physical and chemical concepts of polymer body structure which have come into being in the years immediately past. In spite of the great advances made in the molecular theory of mechanical properties, this branch of science requires broad development with respect to the linking of mechanical properties to molecular characteristics, an expansion of the time and temperature ranges of investigation, and characterizations of the technological properties of polymers in the course of processing and utilization.

The report of Professor S. Ye. Bresler dealt with the principal areas of application of ion and electron exchangers. The lecturer noted that the first tasks set to ion exchangers, those dealing with the desalination and deionization of industrial solutions or with the replacement of certain undesirable ions by other ions, were comparatively simple. What was required of the ion exchanger was not selectivity, but rather a universality of absorption with respect to a wide class of ions. Much more complicated problems arise when an ion exchanger is employed for the extraction of specific substances from complex natural or industrial products. The principal problem in this case is the creation of selective sorbents having at least group selectivity, and preferably having individual specificity with respect to given elements. In this field ion exchangers are used, in conjunction with the method of chromatography, for the purification and extraction of rare, dispersed, and radioactive elements, and for the separation of stable isotopes; in the organic-products industry, ion exchangers are employed in the production of antibiotics, vitamins, alkaloids, and active albumin preparations. S. Ye. Bresler devoted some attention to the tendency, now being developed with success, of using ion exchangers as catalysts in chemical reactions. Implicit in this field are, without doubt, great potentialities for carrying out chemical reactions under very mild conditions, very efficiently, and with great selectivity. As the simplest examples of such application of cationites and anionites, it is possible to cite the reactions of saponification and esterification, the hydrolysis of disaccharides and peptides, the production of acetates and the reaction of alcohol dehydration, etc.. In speaking of the employment of ion-exchange resins, the lecturer pointed out that their principal advantage in chemical synthesis is the fact that they are insoluble; this makes it possible to carry out the reaction without clogging up the system by foreign reagents.

The report of Prof. A. A. Berlin dealt with the methods used in modifying polymer properties. Having noted the great advances in the field of polymer synthesis, which have facilitated segregation into independent classes, the lecturer stressed the necessity of property modification in order to obtain products which combine various valuable qualities. The existing methods of polymer property modification were divided by the lecturer into 4 basic groups. To the first group belong the various intramolecular transformations within the limits of one chain. These are primarily the cleavage reactions of atoms or groups of atoms, and the reactions of intramolecular cyclization. Frequently such transformations constitute an aggregate of these two types of reaction. The lecturer cited a large number of examples of such transformations, as a result of which it is possible to synthesize products with highly valuable properties. By means of such methods it is possible to obtain high-strength and heat-resistant products; it is the lecturer's opinion that the problem of heat-resistant polymers can be solved through the employment of organic polymers with systems of double conjugate bonds. The second group of modification methods comprises the reactions with substances of low molecular weight, which are not subject to homopolymerization. These are the polymeranalogous [polimeranalogichnyye] transformations. To them in the first place belong the numerous reactions of sulfonation, phosphorylation, and mercaptylation [merkaptilyrovaniye]. The lecturer includes in this group of transformations also the reactions of vulcanization. Particular attention was devoted in the report to polymeranalogous transformations in inorganic polymers, it being the opinion of the lecturer that in this manner it is possible to solve the problem of the industrial processing and utilization of inorganic polymers. The end-group and active-center reactions (block copolymers) were assigned by the lecturer to the third group of methods.

In characterizing the diverse methods of obtaining block copolymers, A. A. Berlin emphasized in particular that this type of transformation makes it possible to synthesize not only the linear block copolymers, but the branch and three-dimensional block copolymers as well. Classed as belonging to the fourth group of methods were the reactions of low-molecular-weight and polymer molecules with the intramolecular groups and active centers of macromolecules. Various methods were examined of graft by copolymerization, whereby it is possible to obtain various branch and three-dimensional polymers.

In a report presented by a group of coworkers at the NIIRP (Nauchno-issledovatel'skiy institut rezinoy promyshlennosti -- Scientific Research Institute of the Rubber Industry), Professor A. S. Kuz'minskiy dealt with those most important aspects of the aging problem which are directly applicable in practice. Submitting to a detailed examination the mechanism of chain radical aging, as

it develops in the storage, use, and processing of many polymers, the lecturer gave a detailed analysis of the present state, and of the prospects for the development, of research on the basic forms of the thermal, photochemical, fatigue, and radiation aging of polymers.

While the plenary reports constituted surveys which generalized the present state of some field of polymer science, the work of the sections was devoted to an examination of the state of scientific and technical developments pertaining to the specific trends of greatest importance to the sphere of activity of the sections concerned.

At the meetings of the Section on Films, Coatings and Adhesive Materials, questions were discussed dealing with the protective coverings, film and adhesive materials industry. The greater part of the reports delivered at the meetings of the section dealt with producing, and investigating the properties of, paint and varnish coatings on the basis of various polymers. The report of Ya. L. Raskin, A. A. Berlin, G. L. Popov, T. Ya. Kefeli, K. P. Belyayev, L. D. Shmayn and V. Yu. Erman (State Research and Planning Institute No. 4) dealt with the results of projects investigating the possibility of using polyester acrylates in paint and varnish coatings. The possibilities of carrying out polymerization in a thin layer in the presence of air were investigated, as well as the polymerization rates of various polyester acrylates. Study of the properties of the films produced demonstrated the superiority of varnishes based on economically accessible polyester acrylates over those currently in use. V. K. Smirnov and Ye. I. Lyamshina (Scientific Research Institute of the State Committee on Chemistry) discussed the principal physical and chemical properties of varnishes based on resol resins. Increased process precision in the production of the resin, as well as the introduction of accelerators, filters and pigments permitted the quality of the varnish coating to be improved. Synthesized varnishes are recommended for protecting chemical apparatus from the effects of aggressive media. In the report of A. Ya. Drinberg, B. M. Fundyler, and Ye. A. Volynskaya (Leningrad Technological Institute imeni Lensovet) there were discussed the prospects for the use, in coatings of a carboxyl-containing copolymer of methyl methacrylate based on methyl methacrylate and methacrylic acid. The production of graft copolymers suitable for paint and varnish coatings, which combine the high adhesion and resistance to atmospheric corrosion of methacrylate with the higher resistance to oils and chemical reagents and the limited solubility of polyvinyl chloride was dealt with in the communication of A. A. Berlin, L. V. Stupen', B. I. Fedoseyev, and D. M. Yanovskiy (Branch of the Scientific Research Institute of the State committee on Chemistry). Among the communications included are: an interesting report by A. A. Berlin, T. A. Makorova and Ye. F. Rodionova (All-Union Institute of Aviation Materials) dealing with the dependence of the adhesion,

hardness, and resistance to heat of coatings based on copolymers of methacrylic esters on the content therein of carboxyl, hydroxyl and epoxy groups; the report of S. V. Yakubovich, Yu. D. Rivlin, and N. L. Maslennikov (State Research and Planning Institute No. 4) dealing with an investigation of the mechanical properties of paint and varnish coatings based on nitrocellulose with alkyd and alkyd-melamine resins; the communication of V. V. Zhebrovskiy, M. I. Karyakina, F. I. Rubenshteyn and S. V. Yakubovich (State Research and Planning Institute No. 4) concerning research on protective coatings based on high-molecular-weight compounds, under tropical-climate conditions, and also the communications of S. R. Rafikov, V. G. Ben'kovskiy, V. G. Gutsalyuk, M. N. Mikhaylov and Ye. I. Belosludtseva (Institute of Chemical Sciences of the Kazakh SSR Academy of Sciences, the Petroleum Institute of the Kazakh SSR Academy of Sciences, the Novosibirsk Plastics Plant, the "Kazakhstanneft'" [Kazakhstan Petroleum] Society) on the employment of polyvinyl chloride for the protection of underground pipelines against corrosion. The report of A. Ya. Korolev and F. K. Borisova (All-Union Institute of Aviation Materials) touched on questions connected with a study of the possibilities of sharply increasing the adhesive properties of chemically inert polymers through introduction, into the surface layer of the polymer, of adhesively active groups (hydrosilicate, carboxyl, etc.). S. A. Shreyner and P. I. Zubov (Leningrad Branch of State Research and Planning Institute No. 4, Physics and Chemistry Institute imeno L. Ya. Karpov) imparted information concerning a new method of determining the adhesive properties of protective coatings, the method being based on determination of the ultimate value of the internal stresses in the thickness of a rigid isotropic underlayer with the spontaneous breaking away of adhesive films. Three reports, presented by a group of coworkers at the Scientific Research Institute of Motion-Picture Photography, had as their theme the employment of polymers in the motion picture materials industry: the report of P. V. Kozlov, B. A. Bekunov, B. A. Tsarev, and B. Yu. Vilenskiy on problems of the employment of synthetic polymers in conventional and chromogenic layers of photosensitive materials; the report of L. V. Rozental' on the employment of polymer coatings in motion-picture materials, and the communication of B. N. Korostylev, Ye. F. Russkova and P. V. Kozlov on the properties of films, for motion-picture materials, produced on the basis of polyethylene terephthalate, polycarbonates, and polystyrene.

A number of reports treated problems of the technology of the preparation and processing of films based on various polymers, and the employment thereof as packing material. Thus the communication of N. V. Andrianova, L. G. Batalova, I. F. Kanavets, and Ye. D. Yermakova (Scientific Research Institute of Plastics) discussed the conditions necessary for reprocessing polyethylene terephthalate

into film. Some data are cited, in this communication, concerning schedules for the drawing and stabilization of polyethylene terephthalate blanks; in addition, methods of cementing are recommended and the types of cement indicated. N. N. Samosadskiy and S. S. Mindlin (Okhotinsk Chemical Kombinat) reported on a new technique in the production of polyethylene film. G. V. Avilov (Scientific Research Institute of Motion Picture Photography) cited some data concerning fluoroplastic film, used as a base for magnetic tape. The employment of polymers and the various compositions of the bases thereof for use as packing material formed the subject of communications from S. V. Genel', D. V. Konovalova and S. S. Shchegol' (Scientific Research Institute of Food Machinery), A. A. Berlin, S. M. Barkan and A. A. Berlin (sic), Z. V. Khokhlova, L. Bulatnikova (Moscow Technological Institute of the Meat and Dairy Industry).

At the section meetings, a series of reports was delivered on the production of synthetic cements. The report of D. A. Kadashov was a survey of the contemporary state of the arts in the field of adhesive synthetic materials. A. A. Berlin, V. N. Solov'yeva and S. K. Khomyakova (All-Union Institute of Aviation Materials) reported on a newly-developed method for obtaining a cement composition via the formation of three-dimensionalgraft polymers with the reaction of tetrafunctional monomers of the acrylic series with polyacrylates or polyvinyl acetate. It was shown that such cement compositions possess great viability and permit the amontation of metals and nonmetallic materials. The communication of Z. G. Ivanova, M. V. Sobolevskaya and M. Ye. Kiselev (All-Union Institute of Aviation Materials) deals with the development of cement compositions on the basis of graft and block-copolymers of the VS-101T and VS-35 type. The communication of V. N. Solovyeva, D. A. Kardashov and I. S. Murina (All-Union Institute of Aviation Materials) touched on problems of the employment of phenol resins jointly with elastomers to obtain heat-resistant adhesives. Of the other reports at this section it is necessary to mention: the report of A. Ya. Drinberg (deceased), A. B. Peyzner, N. A. Fermor, Ye. V. Rozengart, V. V. Zherebosvskiy, Kh. M. Livshits, V. M. Kobetskaya, L. P. Kulakova and O. N. Vstinova (State Research and Planning Institute No. 4, Leningrad Technological Institute imeni Leningovet, All-Union Scientific Research Institute for Synthetic Rubber imeni S. V. Lebedev) on the preparation of latexes based on a copolymer of styrene and butadiene, used in the manufacture of paints used in construction work, and finally, the communication of V. K. Smirnov and Ye. S. Vovshina (Scientific Research Institute of the State Committee on Chemistry) on the employment of thermally resistant material based on graphite, esters, silicon-organic compounds, and resol resins for protecting chemical equipment which is subject to the action of aggressive media at high temperatures.

The employment of polymers in the construction of electrical machinery and equipment was dealt with by the Section on Dielectrics. The questions discussed dealt with investigation of the properties of various polymers, and of the materials serving as bases for them, employed in various fields of electrical engineering. The report of K. A. Andrianov (All-Union Electrical Engineering Institute), who disclosed some results of the study made by them of the rules governing the thermal aging of polyorganosiloxans employed in the production of heat-resistant electrical-insulation enamels. Many reports had as their theme the employment, and investigation of the properties, of electrical-insulation materials based on various silico-organic polymers. Among them are: the communication of G. Ye. Golubkov (All-Union Electrical Engineering Institute), in which is discussed the interrelationship between dielectric permeability, loss value, and the structure of silica-organic compounds containing polar groups in organic radicals; the report of V. V. Skipetrov (All-Union Electrical Engineering Institute) on the employment of various silico-organic polymers for the insulation of low-voltage electrical machinery, and the report of V. A. Volkov (All-Union Electrical Engineering Institute) on the employment of polyorganosiloxans for the insulation of high-voltage electrical machinery; N. G. Novikov, K. A. Andrianov, and Ye. P. Larkin (All-Union Electrical Engineering Institute) told of the employment of polyorganosiloxans for the manufacture of heat-resistant glass-textolite cylinders and pipes, operating at 180°. Silico-organic polymers as a material for the manufacture of electric-insulation plastics were discussed by the following speakers: V. V. Baranovskiy, Ya. L. Shugal, A. M. Chernyakova, N. S. Falkina, Ye. V. Avrasina, and S. T. Makhan'kov (All-Union Electrical Engineering Institute), as well as S. N. Ustinov, K. Ye. Krupenya, A. A. Kazakova, and E. Z. Asnovich (All-Union Electrical Engineering Institute). K. V. Kapralov (All-Union Electrical Engineering Institute) set forth some data on the properties of striated electric-insulation plastics based on polyorganosiloxans, modified by unsaturated polyesters, and those based on epoxy resins, combined with phenol-formaldehyde resins and mixed methacrylic esters. K. I. Zabyrina, M. B. Fromberg, Ye. P. Gruzdova, and V. M. Mantrova (All-Union Electrical Engineering Institute) told of the employment of some organic and silico-organic polymers for the production of electric-insulation varnish-impregnated fibers. The subject of the report by K. P. Grinevich was the employment of silico-organic compounds for the hydrophobization of dielectrics and other materials. The reports delivered at the section also touched upon the employment, in various fields of electrical engineering, of such materials as: low-molecular-weight polyisobutylene as a dielectric (K. N. Konstantinov, M. A. Mullin, A. P. Savostin, Ye. S. Chemodanova, N. M. Yakubovich, V. I. Karabanov, and T. F. Danilova - Synthetic Rubber Plant imeni S. V. Lebedev); elastic

polymers based on polyesters of terephthalic acid for the production of enamel conductors for electrical machinery and equipment operating at 130° (O. I. Gribanova, K. A. Andrianov, G. Ye. Golubkov, I. I. Kravtseva, A. G. Prelkova - All-Union Electrical Engineering Institute); a copolymer of vinyl chloride and butyl acrylate for insulating conductors and cables (S. A. Zlatina, A. N. Levin - Moscow Institute of Chemical Machine Building); foam plastics as a dielectric in the centimeter wave band (M. Ya. Borodin - All-Union Institute of Aviation Materials); a series of new synthetic fibers as electrical insulation material in the cable industry (V. A. Privezentsev - Scientific Research Institute of the Cable Industry); epoxy resins employed for the manufacture of cast insulation (A. V. Koval'skaya - All-Union Electrical Engineering Institute). Of considerable interest to the industry are such materials as thermostable electric-insulation compounds based on polyorganosiloxans and polyesters (communication of A. S. Chernichkina, K. A. Andrianov, O. I. Gribanova, and A. G. Prel'kov - All-Union Electrical Engineering Institute); cold-setting elastic heat-resistant compounds (A. I. Mizikin, N. B. Baranovskaya - All-Union Institute of Aviation Materials); moistureproof enamel coatings for metallized non-wire resistances (B. I. Yakovlev, B. A. Bochkareva, T. I. Vorogushin, Yu. F. Kopytina, Ye. I. Romanova, and D. I. Yeremenko). S. A. Yamanov (All-Union Electrical Engineering Institute) in a report entitled "The Action of Radiation on Dielectrics and Electrical Insulation Materials" discussed the dependence of the electrical and mechanical properties of some polymers on radioactive irradiation.

At the sessions of the Section on Rubbers and Elastomers, much attention was devoted to problems of vulcanization. The report of M. S. Fel'dshteyn, E. N. Belyayeva, and B. A. Dogadkin (Scientific Research Institute of the Tire Industry) discussed the effectiveness and the mechanism of the joint action of accelerators in relation to their chemical composition. The authors proposed new principles for the composition of dual high-activity accelerator systems for higher vulcanizing temperatures. A. S. Kuz'minskiy, L. S. Fel'dsheyn, P. Sh. Frenkel', and S. Ye. Khanin (Scientific Research Institute of the Tire Industry) provided a basis for the vulcanization of elastomers based on a number of rubbers by means of Captax without sulfur, and for the considerable acceleration of vulcanization by means of some organic salts. In such a case the vulcanized rubbers obtained by this method are superior, in a number of properties, to conventional sulfur-vulcanized rubbers. In another report by the same authors, entitled "New Vulcanization Activators", data were set forth concerning the properties of mixtures which contain, as activating agents of vulcanization, the ammonium salts of some organic acids. The employment of such activators permits a considerable increase in the rate of vulcanization of mixtures based on natural rubber and on some synthetic rubbers, and improves the quality of such mixtures. The

report of M. S. Fel'dshteyn, I. I. Eytingon, Z. N. Tarasova, and B. A. Dogadkin (Scientific Research Institute of the Tire Industry) deals with results of the employment of diethylaminomethyl-2-thiobenzothiazole as a vulcanization accelerator for butadiene styrene rubbers. G. A. Blokh (Dnepropetrovsk Chemical and Technological Institute) shed some light on the employment of demethyl-dithiocarbonate of zinc and its combination with amino-containing compounds as an accelerator for low-temperature vulcanization in cable manufacture and in the replacement of tire tread in tire-casing repair. M. Z. Zakharova, N. B. Baranovskaya, B. F. Alekseyev, and A. A. Berlin (All-Union Institute of Aviation Materials) told about the cold vulcanization of silico-organic rubber, whereby it is possible to produce elastomers at room temperature. Much attention was paid in the reports to the employment of new materials in elastomer mixtures. G. N. Buyko and A. G. Shvarts (Scientific Research Institute of the Tire Industry) examined some questions concerning the employment of polyisoprene synthetic rubber. N. M. Arenzon, G. N. Buyko, N. P. Zinchenko, A. A. Lyalin (Scientific Research Institute of the Rubber Industry) reported on prospects for the employment, in the tire industry, of oil-filled butadiene styrene copolymers. V. L. Tsaylingol'd, M. I. Farberov, and V. G. Epshteyn (Yaroslavl' Technological Institute, Scientific Research Institute of Monomers for Synthetic Rubber) reported on the results of their investigation of the copolymers of butadiene and 2-methyl-5-vinylpyridine as general-purpose rubbers. L. N. Kozlovskaya, L. V. Nozdrina, N. I. Rudenko, and A. A. Berlin (All-Union Institute of Aviation Materials) proposed a new method for the production of heat-resistant sponges rubbers. A number of reports dealt with changes in the properties of existing vulcanizers resulting from the introduction of large quantities of softeners (V. G. Epsheyn - Yaroslavl' Technological Institute), the introduction of new plasticizers (S. S. Spasskiy, N. A. Obolonskaya, V. I. Yudin, S. B. Ginzburg, Ye. S. Togil'tseva - Institute of Chemistry of the Urals Branch of the USSR Academy of Sciences), the development of wear-resistant elastomers, of various composition, on the basis of synthetic and natural rubbers (A. M. Popova, S. G. Zhavoronok, G. A. Finkel'shteyn - Leningrad Technological Institute imeni Lensovet). It should however be noted that the work of the section did not devote sufficient attention to questions of the development of wear-resistant elastomers on the basis of polyurethans, polybutadienes with a regular structure, etc., nor to the employment of saturated polymers for the development of high-strength and highly elastic elastomers.

A number of reports of the Scientific Research Institute of the Tire Industry dealt with problems connected with the study of wear resistance and fatigue strength of rubbers and of rubber-fabric structural elements. Among these are: the report of N. L. Sakhanovskiy, L. A. Smirnova, and V. A. Yevstratov on the dependence

of the wear-resistance of rubbers on their composition and properties; an investigation of the strength and of the characteristics of disintegration in a cord-adhesive-rubber system (report of R. V. Uzina and V. Ye. Basin, and the report of M. S. Dostyan, D. M. Sandomirskiy, and R. V. Uzina); the report of G. N. Buyko, A. I. Tumanova, N. P. Zinchenko and N. A. Pruzhanskaya, dealing with the endurance of multilayer rubber and rubber-cord systems under dynamic load conditions, and also the communication of coworkers at the Leningrad Technological Institute imeni Lensovet - I. S. Okhrimenko, I. S. Belen'kiy, M. N. Potapenko, and I. A. Beynberg, concerning the investigation of internal pressures in the process of rubber formation and vulcanization.

Also discussed at the meetings of this section were questions dealing with the industrial application of latexes (the report of A. I. Savinkov, S. S. Voyutskiy, V. V. Chernaya, A. B. Peyzner - Scientific Research Institute of Rubber and Latex Products, and the report of A. A. Berlin, P. V. Uzina, and L. I. Shmurak - Moscow Technological Institute of the Meat and Dairy Industry), the rolling of rubbers (A. Ye. Grinberg, A. I. Tsvetkov, A. P. Makeyeva, A. S. Prashchikina, I. M. Makarova - Scientific Research Institute of Rubber and Latex Products), and rubber reclaiming (I. A. Shokhin - Scientific Research Institute of the Rubber Industry).

The work of the Section on Chemical Fibers was devoted to the discussion of questions concerned with the production of various types of artificial and synthetic fibers. Of the most important scientific and technical problems faced by the chemical-fiber industry, the section dealt with the production of new types of synthetic fibers, particularly in the field of the production of new carbon-chain fibers from copolymers of acrylonitrile with acrylic and methacrylic acids (report of Yu. V. Vasil'yev and Z. A. Rogovin - Moscow Textile Institute). N. V. Nikhaylov, Z. V. Ukhanova, N. B. Pokrovskaya, and L. G. Tokareva (All-Union Scientific Research Institute for Artificial Fiber) reported on the new method developed by them for the production of modified fibers on the basis of perchlorvinyl and cellulose derivatives ("acetochlorine" [atsetokhlorin] and "vinitron"). The report sets forth results of the investigation of the properties of these fibers, and indicates the probable areas of their application. The report of A. A. Konkin, B. V. Petukhov, G. M. Terekhova, and V. D. Aksel'rod (All-Union Scientific Research Institute for Artificial Fiber) entitled "Basic Questions of the Production Technology of Polyester Fiber" contained data on the production of polyethylene terephthalate and on the forming thereof into staple fiber and silk. The report of T. I. Sheyn, N. V. Demin, and Ye. A. Nemchenko (All-Union Scientific Research Institute for Artificial Fiber) presents data on the physical and mechanical properties of new types of fibers based on aminocarbonic-acid polymers, with reference to the requirements of the textile industry. Some

reports also dealt with the forming, and investigation of the properties, of fibers based on stereoregular polypropylene (Z. A. Rogovin, S. A. Nechayeva, T. V. Druzhinina - Moscow Textile Institute, and U. S. Klimenkov - All-Union Scientific Research Institute for Artificial Fiber); those based on polyvinyl alcohol (Yu. M. Gol'dfarb - Artificial Fiber Plant); those made of copolymers based on acrylonitrile with methyl methacrylate, methacrylamide, vinyl acetate, butyl vinyl sulfonate, and other monomers (V. S. Dyurnbaum, M. A. Markova, I. S. Dorkhina, V. S. Klimenkov, G. I. Kudryavtsev, A. B. Abkin, and E. A. Kulev - All-Union Scientific Research Institute for Artificial Fiber); those based on esters of cellulose and albumen, grafted with acrylonitrile (Ye. A. Kuril'chikov, M. P. Pen'kova, A. N. Vidisheva - All-Union Scientific Research Institute for Artificial Fiber). The report of I. S. Margolin (All-Union Scientific Research Institute for Artificial Fiber) contributes some data on the properties of "lavan" (made from polyethylene terephthalate) and of "nitron" (made from polyacrylonitrile), and on the products manufactured from these fibers. A study of the relationship of the molecular structure of cellulose to the strength of cellulose hydrate fibers, was the subject of a report by V. I. Ivanov and B. A. Zakharov (Institute of Organic Chemistry). Also discussed at the section were questions dealing with production techniques, and with property modifications in the fibers obtained. Thus, in the report of A. T. Serkov, A. A. Konkin, and I. N. Kotomina (All-Union Scientific Research Institute for Artificial Fiber) are cited the results obtained in producing viscose cord possessing a strength 20-20 % above that indicated in production standards, and some conclusions are set forth regarding the part played by the orientational jacket in strengthening the fiber. The report by Ye. M. Mogilevskiy (All-Union Scientific Research Institute for Artificial Fiber) concerned an important technical problem dealing with the chemistry and technology of the continuous process of the forming of viscose silk. The lecturer set forth the basic conditions for the forming of fiber, which are linked with the continuous-process scheme for its production. The reports of B. E. Geller (Kalinin Branch, All-Union Scientific Research Institute for Artificial Fiber) and Ye. S. Roskin (Leningrad Textile Institute imeni S. M. Kirov) dealt with some aspects of the forming of polyacrylonitrile fiber. The impartation of curl to a fiber in the process of its forming was discussed in communications from Ye. A. Kuril'chikov, L. N. Tkacheva, and L. A. Maslova, as well as from Uy. A. Mazov (All-Union Scientific Research Institute for Artificial Fiber). Note should also be taken of the report by V. A. Berestnev, T. V. Gatovskaya, A. B. Orlova, Ye. Ya. Yaminskaya, and V. A. Kargin (Scientific Research Institute of the Tire Industry), wherein were set forth the results of research on fiber disintegration taking place on the basis of macrodefects which exceed molecular dimensions, and the communication of Z. M. Kozyreva and I. N. Nachdayeva

(Scientific Research Institute of the Tire Industry) concerning some data with respect to investigation of the endurance and impact strength of tire cord. It is, however, necessary to stress that the range of questions dealt with in the reports and communications delivered at the meetings of this section does not nearly exhaust the scientific and technical problems faced by the chemical-fiber industry in our country. Thus, for instance, the decisions adopted by the section take note of the shortcomings in its work as manifested by the absence of investigations devoted to the production of high-strength synthetic fibers, the development of thermally resistant and fireproof fibers, improvement of the quality of the fibers developed through modification of their properties and through the introduction of small additions to the polymers or fibers obtained, and by many other inadequacies.

At the meetings of the Section on the Uses of Polymer Materials in Building, the discussion covered basic questions of the employment of plastics in housing, communal, and industrial construction. The report of V. N. Nasonov and I. V. Rastanin (Central Scientific Research Institute of Building Structures, Section on Petroleum, Chemical, and Paper Industry, Gosstroy SSSR [Gosudarstvennyy komitet Soveta Ministrov po delam stroitel'stva -- USSR Council of Ministers State Committee on Construction]), entitled "Prospects for the Employment of Plastics in Construction", characterized the basic advantages of plastics, with respect to quality and from the engineering and economic point of view, over materials presently in use; the principal problems connected with the introduction of plastics in construction were also discussed. Most of the reports at this section dealt with specific questions of the development of economically justifiable technological processes for producing building materials, and various products and structures, with the aid of polymer materials. In a report entitled "The Use of Plastics in the Fabrication of Building Structures and Structural Parts", A. B. Golubenko (Central Scientific Institute of Building Structures) discussed various types of adhesives and plastics suitable for building structures, and the properties of building structures in the fabrication of which plastics are used. The experience gained with plastics from their use in the erection of wall panels and dwelling-house roofs formed the subject of the report by A. D. Kokin and N. Ya. Revyakin (Special Architectural Design Office of the Mosgorispolkom [Moscow City Executive Committee]). In a report entitled "Basic Questions of Design and Technology of the Plastic Products in a Dwelling-House Section", I. P. Gladchenko and R. D. Dobkin (Scientific Research Institute of Plastics) told about a design and planning project worked out on the use of plastics in the construction of a composite-panel (prefabricated) dwelling house. G. P. Koyerman (Planning Institute No. 2 of the RSFSR Ministry of Construction) reported on the preliminary results of an analysis of the technical efficiency and economic justifiability of the employment

of plastics in industrial construction. A number of reports dealt with the employment of plastics in the development of new building materials. These were the reports of I. P. Uvarov. (Central Scientific Research Institute of Wood Pulp Chemistry), A. N. Otlivan-chik (Scientific Research Institute for New Building Materials), and N. V. Shorygina, G. I. Kurochkina and I. P. Loseva (Scientific Research Institute of Plastics) on the production of slabs from wood shavings with the employment of various adhesives. The report of S. M. Neushev (State All-Union Planning Institute Gipromesterialy) provided information on the production technology of a number of building materials: linoleum and various (fractionated?) [pogonazhnyye] products of polyvinyl chloride resins, finishing tiles of polystyrol, asbestos coumarone slabs for flooring; technical and economic indicators for these products are provided. The employment of various polymer materials for the production of flooring was dealt with in reports by Yu. S. Cherkinskiy (Scientific Research Institute for New Building Materials), Ye. V. Orobchenko (Scientific Research Institute of Building Materials and Products, Ukrainian SSR) and I. A. Shokhin (Scientific Research Institute of the Tire Industry). Some reports presented at meetings of this section dealt with development of techniques for the production of paper-base structural plastics (V. N. Gorbunov - Scientific Research Institute of Plastics), the techniques for producing the building material SVAM on the basis of thick fibers of alkaline-composition glass and fibers of natural mineral substances, and electrical-insulation materials on the basis of thin glass fibers (G. D. Andriyevskaya - Institute of Chemical Physics), techniques for the employment of plastics in the production of asbestos-cement products and structures (K. V. Smirnov - All-Union State Planning Institute (sic) Giprostroymaterialy), an investigation of the physical and mechanical properties of organic-mineral cementless concrete based on furfural resins [no author given]. A number of communications had as their theme the development, on the basis of plastics, of various products in the field of sanitary engineering: the report of A. N. Levin and S. A. Zlatina (Moscow Institute of Chemical Machine Building) on the production of chemically resistant coatings based on copolymers of polyvinyl chloride for protecting concrete and metal structures in chemical shops; the communication of D. F. Kagan, G. I. Shapiro, and G. G. Gusev (Scientific Research Institute of Sanitary Engineering) on the lining of steel tubes with thermoplastic tubes under tension, and, finally, the report of V. Ye. Gul', V. P. Govorov, N. S. Il'yin, Ya. N. Kaplunov, V. A. Laktyushkia, N. S. Mayzel, V. V. Yasinskiy (Moscow Institute of Precise Chemical Technology imeni M. V. Lomonosov, All-Union Scientific Research Institute Giprostroymaterialy) on the employment of electrically conductive polymer materials in the development of electrical heating systems.

The Section on Testing Methods for Polymer Materials concerned itself with the highly important and pressing questions connected with methods for the investigation and testing of polymers and polymer products. Questions were discussed, dealing with methods of testing the mechanical properties of plastics. The report of S. K. Zakharov and M. I. Bessonov (Institute of High-Molecular-Weight Compounds) told of an experiment in the characterization of plastics (on the basis of microsamples) which was reduced to determination of the modulus of elasticity, elongation, tensile strength, heat resistance, and relative impact viscosity. The report of M. I. Bessonov and Ye. V. Kuvshinskiy (Institute of High-Molecular-Weight Compounds) dealt with study of the long-term strength and creep of plastics, also on the basis of tests on microsamples. I. F. Kanavets and L. G. Batalova (Scientific Research Institute of Plastics) reported on a new instrument, the "elastomer" (elasticity measurer), for testing materials at various temperatures and loading rates. With this instrument it is possible to measure structural and mechanical properties in various media under constant tension, frost resistance, and relaxation properties. The development of a new instrument, the "plastomer", which makes it possible to determine the fundamental technological characteristics of thermoplastics in a molten state, was reported on by I. F. Kanavets (Scientific Research Institute of Plastics). Also developing this theme are: the communication of P. V. Melent'yev (Leningrad Textile Institute imeni S. M. Kirov) on new measuring instruments for testing plastics for elongation and torsion; the communication of S. V. Yakubovich and M. I. Karyakina (State Research and Planning Institute No. 4) concerning a new method of determining the thermomechanical properties of paint and varnish films on a pendulum instrument; the report of I. M. Chernin and V. Ye. Gul' (Moscow Institute of Precise Chemical Technology imeni M. V. Lomonosov) about a method, based on the employment of high-speed photography in polarized light, for investigating the mechanical properties of polymers; the report of L. M. Belopol'skiy, B. P. Shtarkman, Ye. Ye. Rylov (Branch of the Scientific Research of the State Committee on Chemistry) and the communication of Ye. S. Osikina and M. M. Gudimov (All-Union Institute of Aviation Materials) on various methods of testing polymethyl methacrylate and products made therefrom, and, finally, the report of S. B. Ratner and S. V. Burov (Scientific Research Institute of Plastics, Scientific Research Institute of the Rubber Industry), entitled "Statistical Processing of the Results of Testing Polymer Materials and the Calculation of Norms for these Materials and for Products Made from Them", in which the authors point to the necessity, in determination of the characteristics of polymer materials, of citing the value of the statistical dispersion. Another trend in the papers presented at the section was manifested in the communications dealing with methods of testing the heat resistance and dielectric properties of plastics. One of

these is the report of I. F. Kanavets (Scientific Research Institute of Plastics) in which is proposed a new method of determining the heat-resistant properties of plastics; this method makes it possible to trace the structural changes of thermoreactive and thermoplastic materials through to 500° and over on the basis of variation in the homogenous shift. This report cites test results for the principal types of plastics. In his report on determination of the heat-resistant properties of glass textolites, B. A. Kiselev (All-Union Institute of Aviation Materials) proposed the employment, as a basic index of heat resistance, of the value of the strength limit in static bending determined at given operating temperatures. In their report entitled "On the Standard Method of Determining the Heat Resistance of Plastics", A. A. Karpova, S. B. Ratner, and M. D. Frankel' (Scientific Research Institute of Plastics) examine the advantages and disadvantages of various methods of determining the heat resistance of plastics (the thermomechanical method, that of Martens, Vik [Wick?], Zhurkov, etc.), and propose the utilization of some additional heat-resistance characteristics. Ye. Ye. Vishnevskiy (All-Union Institute of Aviation Materials) reported on a method of studying the thermal conductivity, temperature conductivity, and heat absorption of structural and thermal-insulation plastics at temperatures from -200° to 1,000°. The communication of A. V. Sidorovich and V. S. Vashchenko (Institute of High-Molecular-Weight Compounds) contains some data regarding the dependence of the deformability of plastics on pressure, as a factor which to a substantial degree determines the index of heat resistance. Contemporary methods of testing polymers were dealt with in a report by P. N. Shcherbak and B. I. Sazhin (Scientific Research Institute of Polymerizational Plastics). This report surveys the contemporary methods of testing the electrical properties of polymers, discusses the existing standards, and indicates ways of improving the test methods. Specific examples and methods of testing electrical properties were contained in reports by P. N. Shcherbak (Scientific Research Institute of Polymerizational Plastics), D. A. Dmitrochenko (Institute of High-Molecular-Weight Compounds), S. P. Kabin and O. G. Us'yarov (Leningrad Polytechnical Institute imeni M. I. Kalinin). A number of reports dealt with various methods of testing elastomers. Thus, the report of M. M. Reynikovskiy, L. S. Press, and M. K. Khromov (Scientific Research Institute of the Tire Industry) tells of the development of efficient methods of testing elastomers for fatigue with respect to tension and compression, back-and-forth bending, and shear, in combination with determination of the dynamic properties. Questions dealing with methods of testing elastomers for resistance to laceration were discussed in the report of A. I. Lukomskaya (Scientific Research Institute of the Tire Industry); this report examines the methods of testing for laceration currently in use, and recommends a more efficient method. In a report entitled "Laceration Tests as a

Method of Evaluating Elastomer Nonhomogeneity", M. M. Reznikovskiy and A. I. Lukomskaya (Scientific Research Institute of the Tire Industry) showed that a comparison of tests on tensile strength and resistance to laceration makes it possible to evaluate elastomer nonhomogeneity. In a report dealing with abrasion tests on elastomers, S. B. Ratner, G. S. Klitenek, and M. V. Mel'nikova (Scientific Research Institute of Plastics, Scientific Research Institute of the Tire Industry, Sverdlovsk Plant of Rubber Industrial Products) examined the drawbacks of determining elastomer wearability on the Grasselli machine, and analyzed the phenomena arising in the abrasion of an elastomer by abrasives of the emory-cloth type. The advantages of testing elastomers for wear on a metal grating were indicated; there was investigated the dependence of wear on the distance between ridges along the surface of a ridge with variation of the load and elastomer composition, and also the dependence of elastomer wearability on the conventional mechanical indicators. With respect to other methods of testing elastomers dealt with in the reports at this section, there should be mentioned the communication on a new method of determining the coefficient of resistance of elastomers to frost (D. D. Fedynkin and N. V. Zakharenko - Scientific Research Institute of Rubber and Latex Products) and the communication concerning a new instrument for determining the adhesiveness of elastomer mixtures (M. K. Khromov-Scientific Research Institute of the Tire Industry). The report of V. V. Chernaya, I. I. Goldberg, and B. A. Mayzelis, (Scientific Research Institute of Rubber and Latex Products) had as its subject the determination of the physical and mechanical properties of latex films. One of the meetings of the section was devoted to a discussion of various methods of chemical, polarographic, spectral, and other methods (sic) of analyzing plastics. The report of N. V. Sokolova [deceased], V. A. Orestova, and N. A. Nikolayeva (Institute of High-Molecular-Weight Compounds), entitled "A High-Speed Method of Determining Haloids and Sulfur in High-Molecular-Weight Compounds", describes a new, simple microscopy method based on the Sheniker (Schoeniker?) microscopy method of haloid determination. Employment of the polarographic method for the identification of some plastics was examined in the report of V. N. Dmitriyeva and V. D. Bezuglyy (Khar'kov Dental Materials Plant). The authors proposed the polarographic analysis of products of theory distillation of plastics, as well as that of their bromine and nitrogen derivatives. M. V. Vol'kenshleya, B. Z. Volchek, Yu. Ya. Gotlib, V. N. Nikitin, and Ye. I. Pokrovskiy (Institute of High-Molecular-Weight Compounds), in a report entitled "Investigation of Polymers by Infrared Spectroscopy Methods examined the principal areas of application of infrared spectroscopy for investigation of the structure and properties of polymers. A. N. Shabadash, A. L. Chebarovskaya, I. A. Vzorova, V. S. Kolokol'chikova (Scientific Research Institute of Plastics, Kus'kov Chemical Plant) reported on the application of

spectral analysis to volatile products in polymers. A method has been developed for the determination of volatile products in various polymer materials by means of ultraviolet absorption spectra of the vapors. Among the other communications, there should be mentioned the report of S. D. Golodnaya and E. A. Akopdzhanyan (Scientific Research Institute of Plastics) on the testing of plastics for resistance to mold; the communication of V. I. Provorov and V. D. Zaytseva (Scientific Research Institute of Rubber and Latex Products) on the employment of the fluorescent method in the rubber industry for investigating the ingredients of light-colored raw rubber mixtures, and their vulcanized products, prepared on the basis of natural rubber; the communication of I. N. Yermolenko, M. Z. Gavrilov, and L. F. Gladchenko (Division of Physical, Mathematical and Technical Sciences, Belorussian SSR Academy of Sciences) concerning a new method of determining small quantities of sorbed water in cellulose through the extinguishing of luminescent dyes; the report of B. P. Yershov (Scientific Research Institute for Plastics) on the employment of high-frequency titration for the analysis of polymer materials, and the communication of K. Ye. Perepelkin (All-Union Scientific Research Institute for Artificial Fiber) on methods for the determination of dissolved and dispersed gases in spinning solutions of polymers.

In the decisions adopted in the Section on Testing Methods, there is noted a gap between the level of the theoretical work and the quality of the industrial products currently in extensive use. Among the resolutions adopted were those advocating that, in the Council on Polymers, there be set up a Section on the Methods of Investigating and Testing Polymer Materials.

The growth in the output of plastics and the development of new polymer materials emphasizes the pressing need for organizing the manufacture of products and the proper utilization thereof in the national economy. Therefore the work of one of the sections of the conference was devoted to important questions concerning the processing of plastics. A number of reports at the section discussed questions connected with the production and processing of glass plastics, with the employment of various types of binder and glass fiber. Included among these is the report of P. Z. Li, T. M. Lukovenko, Z. V. Mikhaylova, L. N. Sedov, and O. M. Levitskaya (Scientific Research Institute of Plastics) on the production of glass plastics with the employment of unsaturated polyester resins on a base of multiatomic alcohols and dicarboxylic acids, as well as the communication of A. S. Gulyayev on the processing of a new type of glass plastic based on resol-type phenol-formaldehyde resin, modified by aniline and polyvinyl butyral with alkali-free glass fiber as a filler. Much attention was paid to the development of heat-resistant glass textolites (the reports of B. A. Kiselev, V. I. Bruyevich - All-Union Institute of Aviation Materials; Ya. D. Avrasin,

Ya. I. Mindlin, A. I. Prigoreva -- All-Union Institute of Aviation Materials; T. M. Lukovenko, P. Z. Li, M. S. Akutin - Scientific Research Institute of Plastics), as well as to the problems of forming products from glass plastics with the employment of various types of binder and glass-fiber material (B. P. Terbenin -- All-Union Institute of Aviation Materials). Among the other subjects dealt with in the reports at this section, it is necessary to note questions connected with the processing and forming of products and structures on the basis of various polyethyl acrylates (Ya. D. Avrasin, A. I. Prigoreva -- All-Union Institute of Aviation Materials; A. A. Berlin, T. Ya. Kefeli, Yu. M. Filippovskaya, Yu. M. Sivergin - Institute of Chemical Physics; G. V. Korolev, B. V. Pavlov, A. A. Berlin - Institute of Chemical Physics); polymethylmethacrylate (D. F. Kagan, G. I. Shapiro - Scientific Research Institute of Sanitary Engineering, V. B. Miller, P. I. Levin, M. B. Neyman, V. A. Kargin, Ye. Ye. Rylov - Institute of Chemical Physics, and Scientific Research Institute of the State Committee on Chemistry; B. V. Perov, V. A. Kargin, M. M. Gudimov - All-Union Institute of Aviation Materials; S. A. Arzhakov, B. P. Shtarkman, Ye. Ye. Rylov - Branch of the Scientific Research Institute of the State Committee on Chemistry; M. M. Gudimov, N. A. Grishin, S. S. Voyutskiy -- All-Union Institute of Aviation Materials; M. M. Gudimov, V. K. Bacharnikov -- All-Union Institute of Aviation Materials; S. Sh. Shchegol', V. K. Galkina, P. Ye. Lande); of polyethylene (N. N. Samosadskiy, S. S. Mindlin - Okhtinsk Chemical Kombinat; N. M. Kvitko - Okhtinsk Chemical Kombinat; N. N. Samosadskiy - Okhtinsk Chemical Kombinat); polycarbonates and polystyrene (V. N. Kotrelev, T. D. Kostrykova, T. L. Renard - Scientific Research Institute of Plastics; V. V. Lapshin - Scientific Research Institute of Plastics); fluoroplastics and phenol formaldehyde resins (V. P. Perepelkin, F. I. Skundina - Karacharovsk Plastics Plant; V. A. Popov, A. A. Berlin, V. A. Kondrat'yeva -- All-Union Institute of Aviation Materials; V. Z. Zakharov, V. I. Sakharova, G. N. Nadezhidina - All-Union Institute of Aviation Materials; N. V. Shorygin and A. G. Chernov - Scientific Research Institute of Plastics); isotactical polyolefins and polyvinyl chloride (K. S. Minkser, Yu. V. Ovchinnikov - Branch of the Scientific Research Institute of the State Committee on Chemistry; A. A. Berlin, Z. V. Popova, D. M. Yanovskiy - Branch of the Scientific Research Institute of the State Committee on Chemistry; V. A. Voskresenskiy, F. F. Fayzullin - Kazan' Engineering and Construction Institute; A. S. Danyushevskiy - Scientific Research Institute of Plastics; Ye. A. Godzevich - Scientific Research Institute of Plastics, G. V. Struminskiy - Scientific Research Institute of Plastics; N. P. Shanin, A. N. Levin - Moscow Institute of Chemical Machine Building); of polyurethanes and organo-silicon resins (A. A. Moiseyev, T. F. Durasova - All-Union Institute of Aviation Materials; A. A. Tager, A. P. Bochkareva - Urals State University); a natural high-molecular-

weight substance - "rabdopiassit" and tarry oil-refining residues (P. D. Tsiskarishvili Institute of Chemistry, Gruzinskaya SSR Academy of Sciences; S. R. Rafikov, V. G. Gutsalyuk, K. Boyarstanova, A. I. Karpenko, T. I. Kvasnaya, M. V. Kustova, K. K. Chuyko - Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Scientific Research Institute of Plastics, Polol'sk Battery Plant). Of the reports at this section, there should also be mentioned the report of S. N. Ushakov (Institute of High-Molecular-Weight Compounds), dealing with questions of the processing and uses of thermoreactive linear polymers containg reactive functional groups in the chain; the communication of V. K. Zavgorodniy (Karacharovsk Plastics Plant) on the mechanization and automation of the processes of producing pressed products from plastics; the communication of I. Sh. Pik, A. S. Sindarovskaya (Karacharovsk Plastics Plant), which sheds light on some data concerning the shrinkage values of plastic products in various pressing directions; the report of V. M. Degtev (All-Union Electrical Engineering Institute), dealing with the employment of dielectric heating in the production of complex electrical insulation materials; the communication of M. I. Balashov and A. N. Levin (Moscow Institute of Chemical Machine Building) concerning methods employed in the determination of forces in machines in the processing of high-molecular-weight materials into products at elevated temperatures, and, finally, the report of G. V. Korolev, B. V. Pavlov, and A. A. Berlin (Institute of Chemical Physics), dealing with the development of a new thermometric method of control in the production of synthetic materials based on polyethylacrylates.

In the reports and communications of the Section on the Employment of Polymer Materials in Machine Building, questions were dealt with concerning the employment of polymers as antifriction materials for slide bearings (K. N. Vlasova and L. A. Nosova - Scientific Research Institute of Plastics; R. M. Matveyevskiy - Machine Science Institute, D. S. Kodnir, Kuybyshev Aviation Institute) and as friction-producing materials for various braking devices (V. A. Zakharov, G. N. Nadezhdina, and V. I. Sakharova -- All-Union Institute of Aviation Materials; I. V. Kragel'skiy and V. M. Gudchenko - Machine Science Institute; Yu. Ye. Kosterin and G. S. Sidorenko - Machine Science Institute, etc.), and also as structural material for the production of gears (S. V. Genel', S. I. Bakanov, Z. S. Smolyan - Scientific Research Institute of Food Machinery Construction); as various kinds of parts working by friction (I. Ya. Al'shits - Central Scientific Research Institute of Technology and Machine Building); in turbine drills (S. M. Perlin - All-Union Scientific Research Institute Burneft' [oil drilling]). The report of V. A. Bershteyn, L. O. Vislennaya and I. A. Yelin (Central Scientific Research Institute of the Marine Fleet) dealt with the employment of polymers (epoxy resins) to protect metal from corrosion in shipbuilding; O. N. Muravkin and A. V. Ryabchenko (Central Scientific

Research Institute of Technology and Machine Building) reported on some results of the testing of polymers for fretting corrosion (corrosion from friction). The authors recommend the employment, as protective coatings against fretting corrosion, of polyamide and metylol polyamide protective coatings, which are highly resistant. Much attention was devoted to problems of the development and employment of new polymer materials in various phases of machine building. The report of M. S. Akutin, L. N. Smirnova, and I. M. Gurman (Scientific Research Institute of Plastics), entitled "New Epoxy Resins in Machine Building", discusses the advantages of employing epoxy resins, and compositions based on them, in machine building. The properties of various materials are described, as well as the areas of their application. A. I. Glukhova, K. A. Andrianov, L. N. Kozlovskaya, and Ye. I. Lyapin (All-Union Institute of Aviation Materials) reported on the new, rubberlike material FKS, based on polytetrafluorethylene [politetraftoretillen] and polydimethylsiloxan rubber. This material is used for the production of sealing parts for use in aggressive media, and as electrical-insulation packing at elevated temperatures. V. S. Titov (Scientific Research Institute of Plastics) reported on the technology of producing ionite membranes, which constitute sheet material containing ion-exchange resins cemented by polymers, and discussed employment of the membranes as partition diaphragms in electrolytic baths. In the report of M. I. Mironov (Scientific Research Institute of Plastics), there are presented data on the employment of foam polyurethanes as soft-elastic and rigid materials in the aircraft and the motor-vehicle industry, in shipbuilding, electronics, the furniture industry, etc. An account is given of the properties of foam polyurethane materials. The report of R. S. Barshteyn (Scientific Research Institute of Plastics) describes new polyvinylchloride masticated elastomers based on nonmigrating plasticizers. The report of M. M. Gudimov and Z. I. Mikheyeva (All-Union Institute of Aviation Materials) dealt with the employment of striated transparent plastics based on polymethylacrylate and polyvinyl butyral films for the windows of pressurized cabins in aircraft. In their communication, V. N. Kotrelov, P. A. Volodin, and A. F. Opolovenkov (Scientific Research Institute of Plastics) dealt with questions concerning the employment of fluoroplastic - 4 for chemical equipment and for the fabrication of instruments. The employment of foam plastics in industry was dealt with in reports by V. V. Pavlov (All-Union Institute of Aviation Materials) and M. Ts. Sakalla, V. Ya. Sudareva, L. M. Nelepova (All-Union Institute of Aviation Materials). Sh. S. Shchegol', V. K. Galkina, and R. Ye. Lande set forth some data on the properties of "polymethacrite" ["polimetakrit"] - a new anti-corrosion material based on electrographite, V. A. Privezentsev (Scientific Research Institute of the Cable Industry) demonstrated the advances made in the development of heat-resistant enamels for

coating conducting wires. His report gives the results of experimental investigations of the properties of enamels based on polymethanes and polyesters. The reports of Ye. G. Semonido, N. V. Shchegolev, N. I. Kaverina and Ye. G. Semonido (sic), N. V. Shchegolev, P. S. Vakurov, V. I. Sharapov, Ye. G. Kuznetsov (Scientific Research Institute of Fuels and Lubrication Materials) dealt with the improvement of the operating properties of lubrication oils by means of polymer additives.

The decisions adopted by the section note a lack of coordination in the research projects. In order to solve problems concerning the introduction of polymer materials in machine building, the provision of a theoretical basis for treatment processes, and for the scientific and technical coordination of projects of the various organizations, the section considers it necessary to set up a scientific research institute on the employment of polymers in machine building.

The reports and communications at the meetings of the eight sections were the subject of active consideration and lively discussions, which were embodied in the resolutions and recommendations, adopted by the section, on the development of scientific research and implementation of the results of experimental projects. These resolutions contain a number of proposals with regard to organizational questions, dealing with the regularization of planning, the coordination, and the carrying out of scientific research in our country in the field of the employment and processing of polymers. The Conference just ended, and the resolutions adopted by it, will unquestionable play a large part in implementing a rational solution of the tasks assigned by the Directives of the Seven-Year Plan with respect to extensive development of the production and use of polymer materials in our country.

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